

Air Force

SBIR

Impact



Unique Light Sources Enhance High Speed Photography in Documenting and Diagnosing Explosive and Ballistics Tests

Company:

Prism Science Works Incorporated

Location:

Everett, MA

Employees:

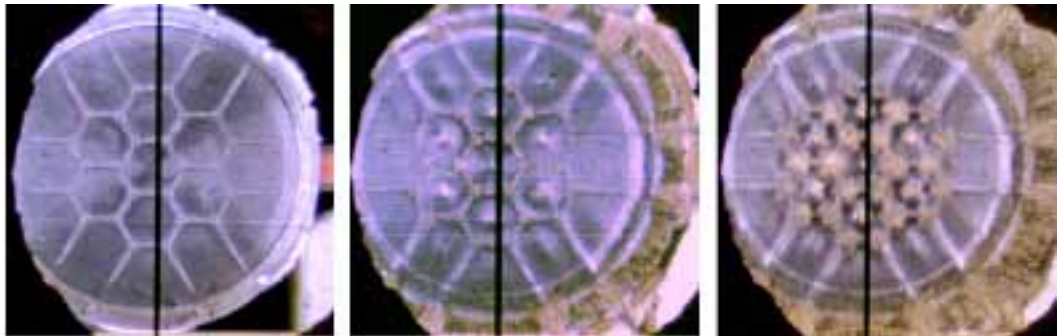
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Project Officers:

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AFRL Munitions
Directorate,
Eglin AFB, FL



High speed photography of the front of a fragmenting plate (or warhead) taken in sequence within a 7 microseconds time period.

Air Force Requirements:

High-speed photography and electronic imaging are critical elements for documenting and diagnosing test events. The Air Force required improved intense broadband illumination sources first, to replace the argon candle – an explosively driven radiating shock wave – used for high resolution color photography at very high speeds (typically 1,000,000 frames per second) and second, to survive the rigors of the adverse test environments for high-speed imaging at 1000s of frames per second.

SBIR Technology:

Prism Science Works developed two unique plasma discharge light sources for high-speed photography under the SBIR program. One system, The MegaSun, generates a large single pulse of intense white light sufficient to replace argon candles. Its inexpensive, modular, surface discharge lamps provide flexible illumination geometry. They are driven by a remote pulse forming network to produce the required duration (30 microseconds to one millisecond).

For more information on this story, contact Air Force TechConnect at 1-800-203-6451 or at www.afrl.af.mil/techconn/index.htm

Prism Science Works won the prestigious "SPIE 2000 Edgerton Award" for its MegaSun technology. The citation observed that the MegaSun "dramatically increased safety and quality of lighting in the high speed photography of detonation and explosive events" and "brings full circle 'the strobe' as the tool for lighting in ultra high-speed photography." Among its advantages are the ability to perform dry runs to verify correct exposure, and the elimination of the damage and waste products produced by the explosive charges in the argon candles.

The second source is a repetitively pulsed system that generates short (microsecond) pulses synchronized with framing cameras operating up to several kilohertz, and suitable for rugged test environments. The evolution of a fast event can be monitored for several thousand frames with its motion being frozen by the short pulse exposure of each frame.

Company Impact:

A MegaSun system installed at a test range at Eglin AFB, Florida has been used routinely to illuminate explosive events and ballistics for high speed photography. Based on its performance, The Department of Energy laboratories are evaluating the system as a method of reducing waste and costs associated with testing explosives. The repetitively pulsed system has parameters suitable for many applications in the automotive test industry. These systems have established Prism Science Works as a key provider of custom illumination sources and led to a contract with the US Coast Guard to provide a compact system for night aerial photography of fishing vessels. Applications in the entertainment industry, crash avoidance, and obstruction lighting are forthcoming.

Company Quote:

"This SBIR topic has enabled Prism Science Works to develop technology that will change the way high speed photography is practiced on government and commercial test ranges, and has created the opportunity to enter the larger markets for entertainment and tower/aircraft lighting."

Robert G. Root, Ph. D.

President

Prism Science Works Incorporated

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